BAIRD MODEL 290 TRANSISTOR PORTABLE RADIO

SPECIFICATION

Transistors	7 transistors plus 2 crystal diodes.
Battery	9 volt. Ever-Ready PP6.
Wave-Bands	Medium Wave 190–550 Metres Long Wave 1150–2000 Metres
Sockets	Aerial and earth sockets at side of case, using standard wander-plugs. Audio output using Pressac type 20/518 jack plug. This socket may be used for an earphone, an extension loud speaker, or a tape recorder, *providing the impedance of the load is not less than 25 ohms.* Most loud speakers in normal use are only 3 ohms and if connected would cause damage to the output transistors.

MECHANICAL DETAILS

The chassis is held in place by three screws in the printed panel.

The control knobs are push on type and the wavechange lever lifts off the two metal pins under the tuning knob. When replacing the knobs, support the controls from the inside to avoid bending the mounting plates.

The loudspeaker leads will have to be unsoldered from the rear of the printed panel for complete removal, although this should seldom be necessary. The connecting clips to the aerial and earth sockets simply pull off and must be re-fitted when replacing the chassis.

CIRCUIT DESCRIPTION

Transistors	3	AF117	(mixer and two I.F. stages).
	1	OC71	(audio amplifier).
	1	OC81D	(audio driver).
	2	OC81	(push-pull audio output).
	OA90	diode	(signal detector).
	OA79	diode	(damping diode).

AERIAL CIRCUIT

Coils L1, L2, L3, L4 and L5 are all on the ferrite rod. Coil L2 which is tuned by C2 and trimmed by C1 on Medium Wave is coupled to the base of TR1, (AF117), the mixer by L4 and L5 in series, and the d.c. isolating capacitor C4. On Long Wave, coils L3 and L2 are connected in series and with C2 form the tuned circuit. Across L3 is C3 which maintains correct tracking of the aerial circuit. The car aerial coupling coil L1 is wound on the same former as the L.W. coil.

OSCILLATOR

Feedback is obtained from the collector to emitter by the coupling windings L6 and L7 together through L8, this being the tuned winding, which on medium wave is tuned by C9. The resistor R31 connected across L8 through C8 and C7 on M.W. keeps the oscillator voltage similar to that on L.W. when L8 is shunted by C8, C7, C9 and C10. Long and Medium Wave trimmers are C7 and C10 respectively. Base bias for TR1 is provided by the potential divider R1 and R2. The emitter components R3 and C5 stabilise the mixer in Class B operation.

Shaped vanes on the oscillator section of the tuning gang C9 eliminate the need for a padding capacitor. A high frequency stopper R4 prevents oscillator harmonics being fed into the I.F. stages.

I.F. AMPLIFIER STAGES

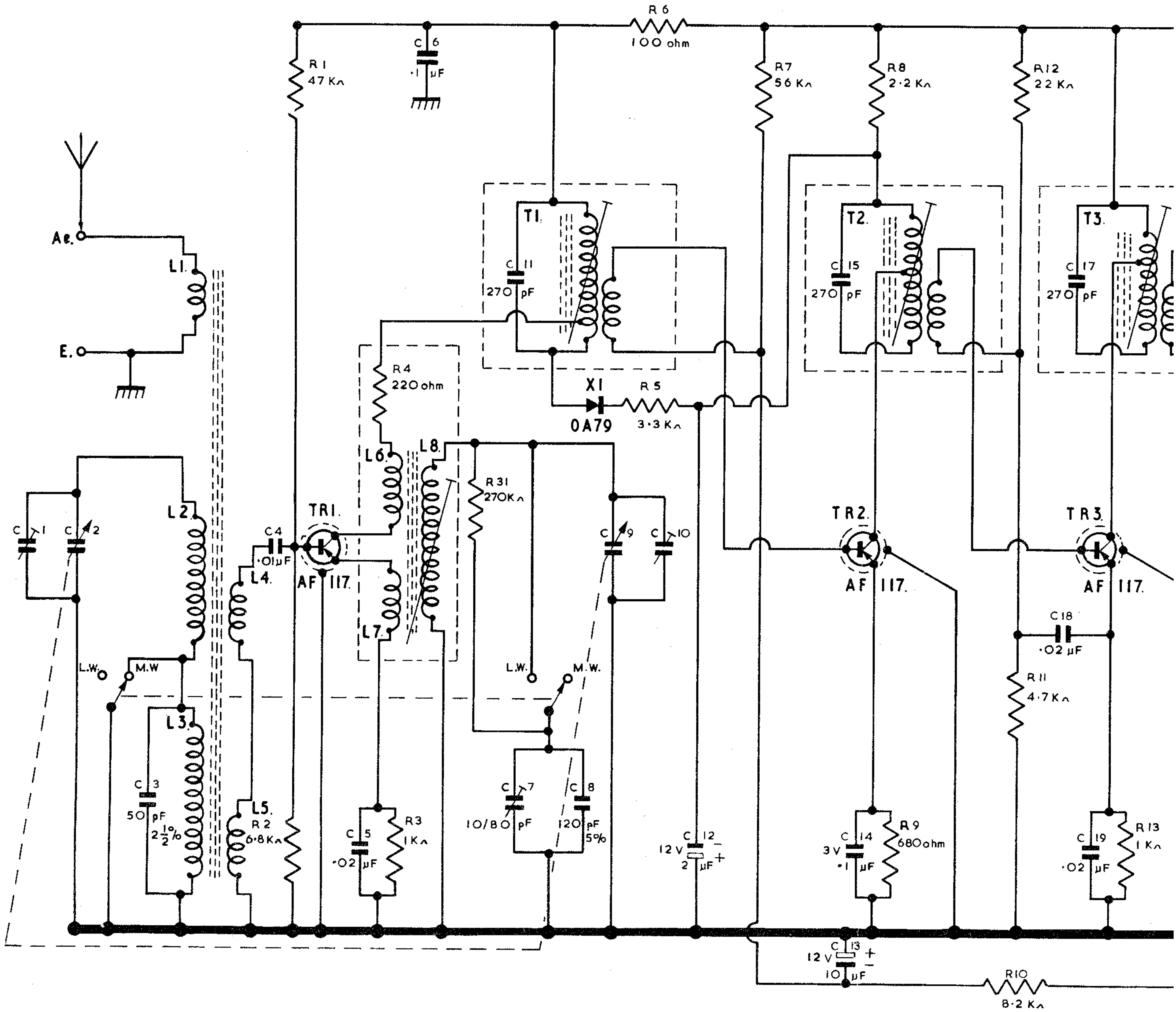
The output of the mixer at 470 Kc/s is tapped into the single tuned transformer T1, which couples to the base of TR2 (AF117). Bias is provided by R7, R10, R15 and X2. Stabilisation of the d.c. condition is by R9, C14. The collector of TR2 is tapped into a single tuned transformer T2, coupling into the base of TR3 (AF117), bias for which is provided by R11 and R12. The collector of TR3 is tapped into a single tuned transformer T3, the secondary of which is connected to the signal diode X2 (OA90).

Detected audio is developed across R14, which is coupled to the volume control by C23 and R32. I.F. filtering is by C20, C21 and R15. The diode X2 and filter components are fitted in a can to prevent harmonic radiation. A d.c. voltage which is produced at the detector, is fed back to the base of TR2 by R15 and R10, decoupled by C20 and C13 to provide A.G.C. The action of the complete A.G.C. circuit is as follows:–

With increased signal strength, an increased positive voltage is developed at the cathode of X2, this is fed through filter networks to the base of TR2 which in turn causes the collector current to decrease and hence the gain. As the current through R8 falls, the positive voltage on the cathode of X1 falls, thus reducing its back resistance, which in series with R5 appears across the tuned winding of T1. This causes a further reduction in gain, and also prevents TR2 from overloading. The series resistor R5 prevents the diode conducting too heavily on very strong signals. C12 decouples any audio component produced across R8 due to the diode action.

AUDIO STAGE

The audio output from the volume control is fed through R17 current feed resistor and C24 to the base of TR4. Base bias for TR4 is obtained from the potential developed across TR5 emitter stabilising resistor R23 by R18. Stabilisation of d.c. condition is by R20. The output from TR4 collector developed across R19 is d.c. coupled to the base of the driver transistor TR5 (OC81D). In the collector circuit of TR5 is the transformer T4, which has a bifilar wound push-pull secondary feeding current to the two bases of the matched pair of output transistors TR6 and TR7 (OC81's). These transistors operate in a single ended Class B circuit with the high impedance speech coil of the loudspeaker (25 ohms) as the load, which is coupled by C27. They are connected in series across the supply and their base bias is established by the network R25, R26, R27 and R28. Emitter stabilisation is by R29 and R30. Some collector current flows in the quiescent condition to prevent crossover distortion. Negative feedback is provided by R21 and R22. Decoupling of the mixer stage is by R6 and C6, the I.F. stages by R24 and C22, and the audio stage by C28 which also reduces the effect of battery ageing. An external socket connected across the speaker enables an earphone, an extension loud speaker or a tape recorder, to be used, the speaker being disconnected when the plug is inserted. The external device should have an impedance of at least 25 ohms, or damage may be caused to the output transistors.

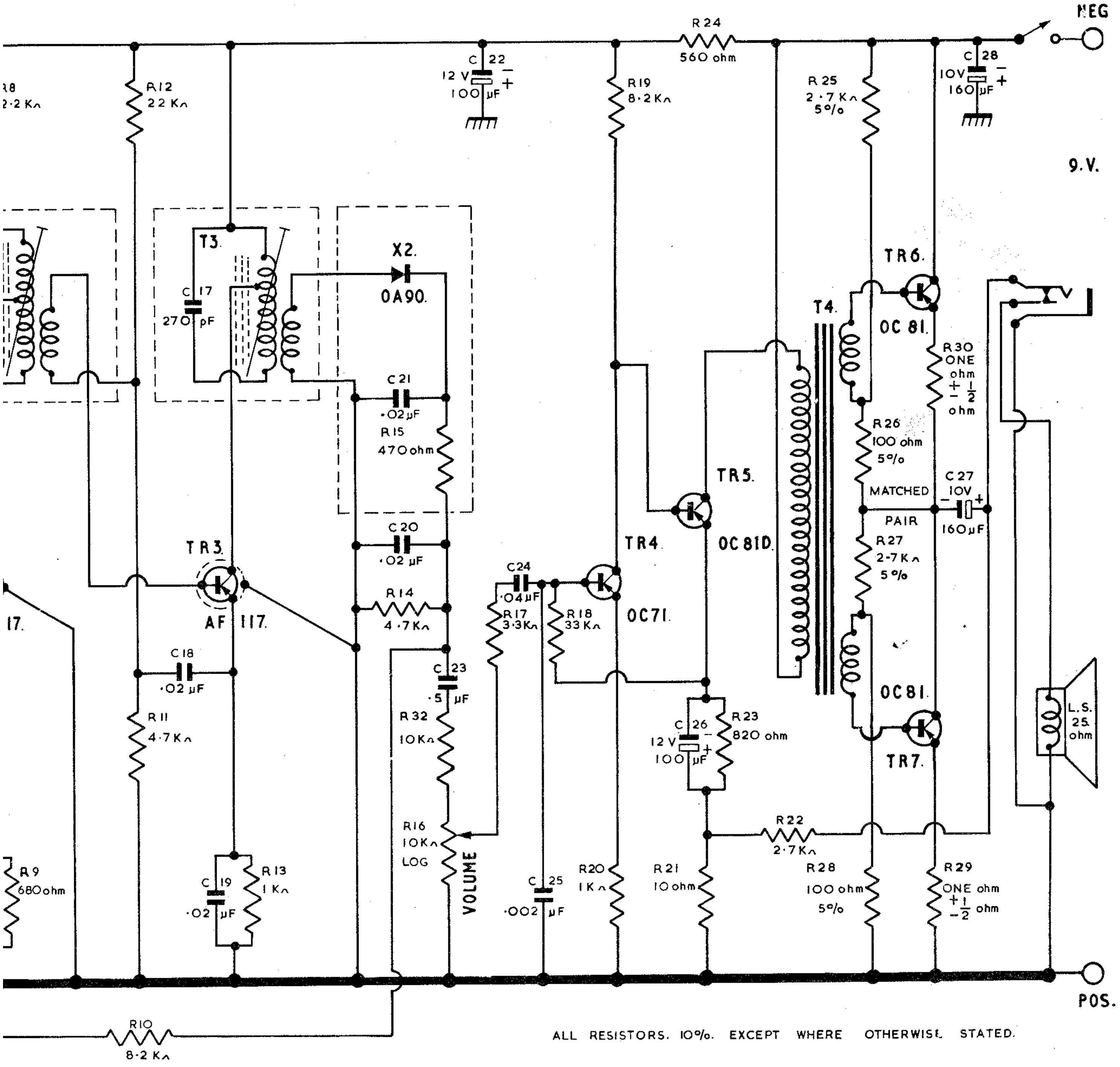


BAIRD M.290 CIRCUIT DI
M.292

MODEL 290 VOLTAGE CHAR

Voltages measured with Avo Model 8 and with respect to po

	Transistor		*Collector*	*Base*	*E*
TR1	Mixer & 1st IF	(AF117)	6.9 V	0.8 V	
TR2	2nd IF	(AF117)	7.0	0.85	
TR3	3rd IF	(AF117)	7.0	1.1	
TR4	Audio amp.	(OC71)	1.3	0.75	
TR5	Driver	(OC81D)	8.8	1.3	
TR6	Output	(OC81)	9	4.65	
TR7	Output	(OC81)	4.5	0.15	



ALL RESISTORS. 10%. EXCEPT WHERE OTHERWISE STATED.

0 CIRCUIT DIAGRAM
2

EL 290 VOLTAGE CHART

Model 8 and with respect to positive chassis (No signal).

llector	*Base*	*Emitter*	*Collector current*
6.9 V	0.8 V	0.6 V	0.6 MA
7.0	0.85	0.7	1 MA
7.0	1.1	1	1 MA
1.3	0.75	0.7	0.7 MA
8.8	1.3	1.25	1.5 MA
9	4.65	4.5	3.4 MA
4.5	0.15	0	3.4 MA

MODEL 290 TRANSISTOR PORTABLE RADIO

ALIGNMENT INSTRUCTIONS

Complete alignment, may if required, be carried out with the chassis fitted in the case.

Equipment Required

1. A.M. Signal Generator covering 160 – 1500 Kc/s.
2. Trimming tools.
3. Output meter (25 ohm impedance) or oscilloscope.

I.F. Alignment

Plug output meter into earphone socket, or connect oscilloscope across speaker terminals. Set tuning gang fully meshed by turning the tuning knob to its fully anticlockwise position (180°). Volume control fully clockwise. Wavechange switch to medium wave position. By means of a suitable loop aerial, or by connection to the external aerial sockets, inject a 470 Kc/s 30% Mod. signal. Increase the output of generator until an indication is obtained at the speaker. As the circuits are aligned the output of the generator should be reduced so as to give about 50 M.W. at the speaker. If this is not done, difficulty will be experienced in finding the maximum tuning points due to the A.G.C. action, particularly in the case of T1 which is damped by the conduction of X1 on strong signals.

1. Adjust core of T3 for max. output.
2. Adjust core of T2 for max. output.
3. Adjust core of T1 for max. output.

It may be found that there is more than one max. tuning point in each case; the one nearest the top of the can is the correct one. Repeat the above procedure to obtain max. output.

R.F. Alignment

Medium Wave

With the gang at fully meshed position, set the pointer to the left hand gap in the centre line of the scale. Turn the tuning knob until the pointer is at 500 metres (152°). Inject a 600 Kc/s signal and tune the core of the oscillator coil (L6, 7, 8) until the signal is obtained. Adjust the medium wave aerial coil L2, by sliding it on the rod until max. output is obtained. Next turn pointer to 200 metres, inject a 1500 Kc/s signal and adjust trimmer C10 until signal is obtained, then C1 for max. output. Repeat the above procedure until scale calibration is correct and best results have been obtained. Secure aerial coils with a suitable adhesive or wax.

Long Wave

Move wavechange switch to L.W. position. Inject a signal of 166.6 Kc/s, tune in signal by means of trimmer C7. Adjust Long Wave coil L3 by sliding it on the rod, for maximum output.

COMPONENT PART NUMBERS

Condensers

Circuit Ref.	*Description*	*Part No.*
C1	Aerial Trimmer	
C2	Tuning gang (Ae. Sect)	CV.1046
C3	50 pF 2.5%	CN.1760
C4	.01 mfd	CN.1748
C5	.02 mfd	CN. 1751
C6	.1 mfd	CN.1750
C7	10/80 pF Trimmer (.LW.)	CV.1128
C8	120 PF 5%	CN.1759
C9	Tuning gang (Osc. Sect)	CV.1046
C10	Osc. Trimmer	
C11	270 pf	CN.1740
C12	2 mfd electrolytic 12V	CN.1219
C13	10 mfd electrolytic 12V	CN.1215
C14	.1 mfd	CN.1752
C15	270 pf	CN.1740
C16		
C17	270 pf	CN.1740
C18	.02 mfd	CN.1751
C19	.02 mfd	CN.1751
C20	.02 mfd	CN.1751
C21	.02 mfd	CN.1745
C22	100 mfd electrolytic 12V	CN.1216
C23	.5 mfd	CN.1756
C24	.04 mfd	CN.1758
C25	.002 mfd	CN.4899
C26	100 mfd electrolytic 12V	CN.1216
C27	160 mfd electrolytic 10V	CN.1220
C28	160 mfd electrolytic 10V	CN.1220

Resistors
10% unless otherwise stated.

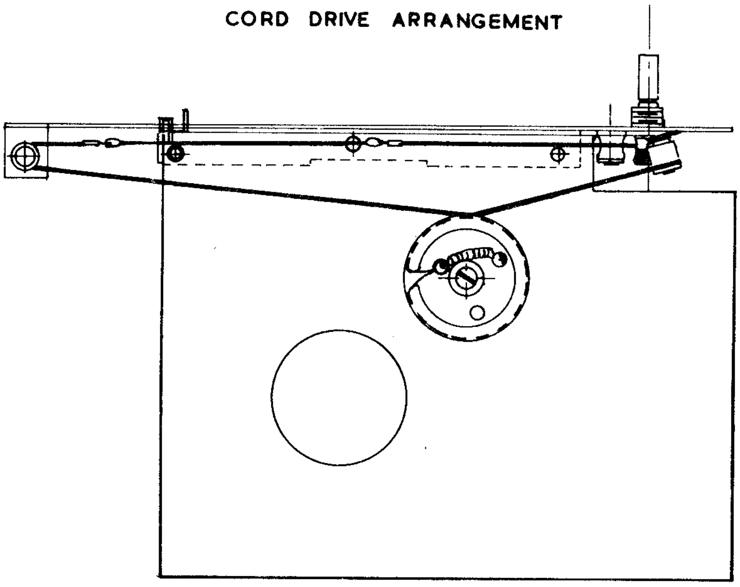
Circuit Ref.	*Description*	*Part No.*
R1	47K	RHS.7473
R2	6.8K	RAS.1682
R3	1K	RAS.1102
R4	220 ohm	RE.4933
R5	3.3K	RAS.1332
R6	100 ohm	RHS.7101
R7	56K	RAS.1563
R8	2.2K	RAS.1222
R9	680 ohm	RAS.1681
R10	8.2K	RAS.1822
R11	4.7K	RAS.1472
R12	22K	RAS.1223
R13	1 K	RAS.1102
R14	4.7K	RAS.1472
R15	470 ohm	RE.4896
R16	10 K Log. Pot V/C	VR.1056
R17	3.3 K	RAS.1332
R18	33 K	RAS.1333
R19	8.2 K	RAS.1822
R20	1 K	RAS.1102
R21	10 ohm	RHS.7100
R22	2.7 K	RHS.7272
R23	820 ohm	RAS.1821
R24	560 ohm	RHS.7561
R25	2.7 K 5%	RAG.1272
R26	100 ohm 5%	RAG.1101
R27	2.7 K 5%	RAG.1272
R28	100 ohm 5%	RAG.1101
R29	1 ohm ± ½ ohm	RE.4932
R30	1 ohm ± ½ ohm	RE.4932
R31	270 K	RE.4941
R32	10 K	RHS.7103

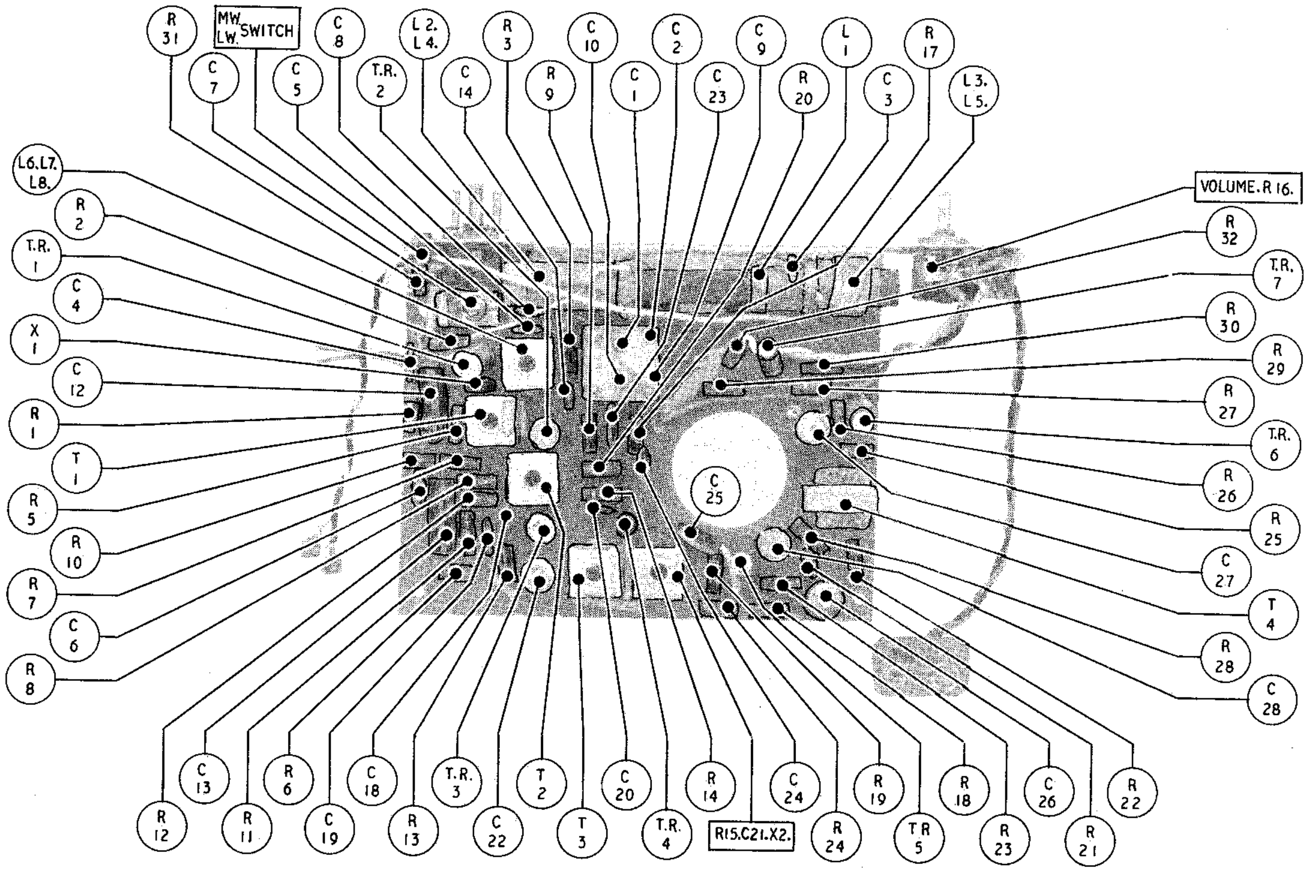
Coils and Transformers

L1–5	Ferrite rod aerial coil assembly	CL.1395
L6–8	Oscillator coil Assembly	CL.1396
T1	1st I.F. Transformer	CL.1397
T2	2nd I.F. Transformer	CL.1398
T3	3rd I.F. Transformer	CL.1399
T4	Driver Transformer	TR.1434

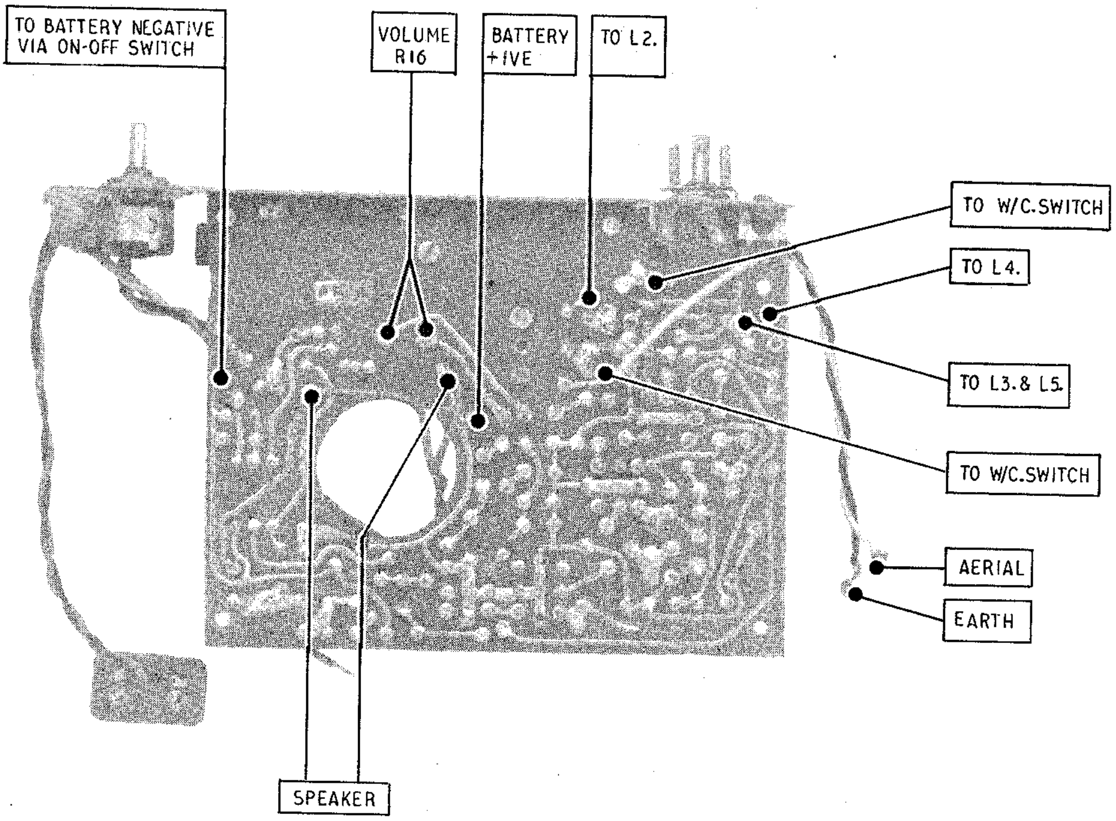
Loud Speaker 25 ohm 3" round	LS.1066
Dial Drum	CV.1285
Nylon Drive cord	CV.1287
Battery Connector Panel	PN.1315
Control knob	KN.1094
Felt washer (white) for controls	NU.4736
Slider Switch (wavechange)	SW.1581

CORD DRIVE ARRANGEMENT





MOD. 290.
CHASSIS LAYOUT DIAGRAM
FRONT. P.R.8.
DRG.No. 3673/1163



MOD. 290.
CHASSIS LAYOUT DIAGRAM
REAR. P.R.8.
DRG. No. 3674/1163